finite variation on $L_2^\nu[a, b]$ and $\psi = \psi_1 + \psi_2$, where $\psi_1 \in L_1(\mathbb{R}^\nu)$ and ψ_2 is a Fourier transform of a measure of bounded variation over $\mathbb{R}^\nu$.

Functionals of the above type where

$$G(x) \equiv \exp\left\{\int_a^b \theta(s, x(s))\,\mathrm{d}s\right\}$$

have been employed to solve the Schroedinger equation with initial condition ψ when θ and ψ are Fourier transforms of bounded measures. This required ψ to be bounded and continuous.

Here we prove the existence of the Feynman integral for such functionals when the ψ need not be bounded or continuous. We also establish formulas for the evaluation of such integrals.

The existence theorems and formulas for calculating analytic Feynman integrals given in this paper parallel those for the sequential Feynman integral. In addition, we show the equality of the analytic and sequential Feynman integral under appropriate hypotheses.

The Feynman Integral of Quadratic Potentials Depending on Two Time Variables

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We show that the double integral of certain quadratic potentials depending on two time variables is in a Banach algebra $\mathcal{S}$ of functions on Wiener space all of whose members have an analytic Feynman integral. Corollaries are given insuring (a) that $\mathcal{S}$ contains a rather broad class of functions involving double integrals of potentials depending on two time parameters, and (b) the existence of the Fresnel integral for such functions.

Stochastic Process of a Fluctuating String

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A *random motion of a string* embedded in R^d may be represented by an R^d valued stochastic process $x(s, t)$, where $s \in [0, L)$ is a string coordinate and $t \in [0, \infty)$ denotes time. Our x satisfies the conditions $x(0, t) = x(L, t)$ and $x(s, 0) = 0$.

We first consider the discretized process $X_{n,p} \in R^d$. $n \in \{1, 2, \ldots, M\}$ and $p \in \{0, 1, \ldots\}$ are discrete variables which are related to the continuous ones by $s = na$ and $t = pt_0(a, t_0 > 0)$. The transition probability from time p to $p+1$ is assumed to be $\mathcal{N}(\{X_{n,p}\}) \exp\{-\bar{K}_0/2 \sum_n (X_{n,p} - X_{n,p+1})^2 - \bar{K}_1/2 \sum_n (X_{n,p+1} - X_{n+1,p+1})^2\}$.

We then take the *continuum limit* $a \to 0$ adjusting the parameters as $t_0(a) = a^2$, $\bar{K}_0(a) = a^{-1}K_0$, and $\bar{K}_1(a) = a^{-1}K_1$. The convergence to the limit is established in